Overview of US work on AES003

JLab AES3 Results

R. Geng, AES Meeting at JLab, Aug 2007

- June 5, 2007: AES003 first RF test, quench limited 18.7 MV/m, no x-ray
- July 27, 2007: AES003 2nd test, quench limited 17.6 MV/m, some x-ray
- Passband measurements performed in both tests
  - consistently showing cell #4 and #6 are quenching cell candidates
  - Cell #1 and #9 reached 31.3 MV/m at 8/9pi mode
- August 6, 2007: AES003 3rd RF test with 8 thermometers attached to cell #4 and #5. Data show cell #6 (From field probe port) is quenching cell

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AES#3 Pass-Band Result

Pi mode	Cell:1,2,3,4, 5,6,7,8,9	17.6 MV/m	Quench	X-ray 37 mR/h
8/9-Pi	Cell 1,9	21.2 MV/m	No-quench	40 mR/h
4/9-Pi	Cell 4,6	18.5 MV/m	Quench	No x-ray
3/9-Pi	Cell 2,5,8	23.5 MV/m	No-quench	4 mR/h
2/9-Pi	Cell 3,7	22.9 MV/m	Occasional quench	0.3 mR/h

No X-ray when quench occurs in preferentially filled cell 4/6.

JLab AES3 Results

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Cernox Resistance Temperature Detectors

AES#3 2.5th test with thermometry
First Step Focused on Equators

Joint test by JLAB and FNAL with help from many colleagues. Special thanks to Dmitri A. Sergatskov

4 TRD on cell #4

4 TRD on cell #6

vity meeting, JLAB 13

JLab AES3 Results

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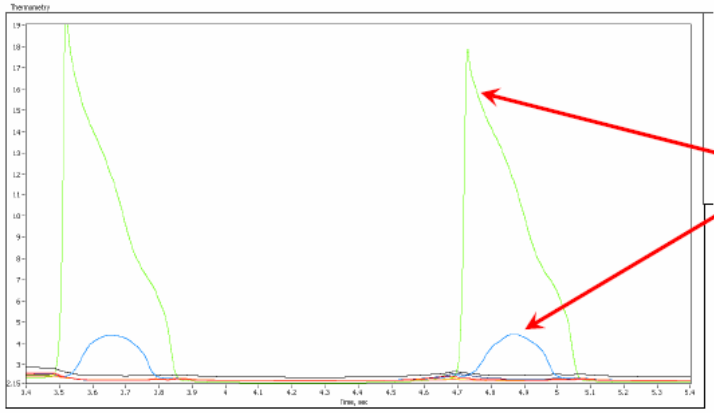
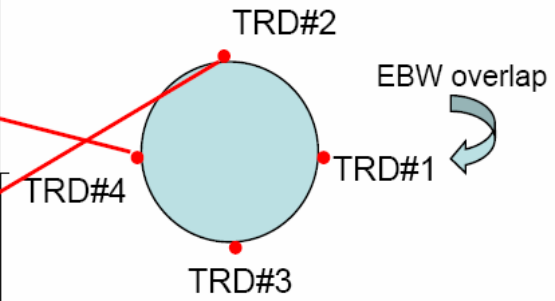
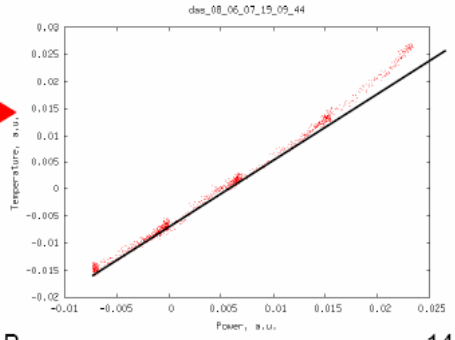
Cell #6 from field probe port reacted,
2K bath: TRD#4 cyclic spike of 20K in synchronism with cyclic collapsing field
Bath above lamda-point: TRD#4 spike also TRD#2
Cell #4 silent





Power sweeping just below quench:
TRD#4 no-linear temperature rise



- Cell 6 found responsible for quench.
- Quench location in the 1/4 cell within TRD#2 & 4.
- EBW overlap not responsible.
- Next test more thermometers around TRD#4.
- Goal is to resolve defect location within 3 mm.

AB

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All cavity processing done @JLab

Processing Recipe
J. Mammosser, TTC Meeting at Fermilab, April 2007

- Processing recipe
  - –Degrease
  - –Electropolishing (20 μm)
  - –Degrease
  - –First HPR+dry
  - –First cleanroom assembly
  - –Second HPR+dry
  - –Final cleanroom assembly
  - –Evacuation and leak check
  - –Low temperature (110 C) bake

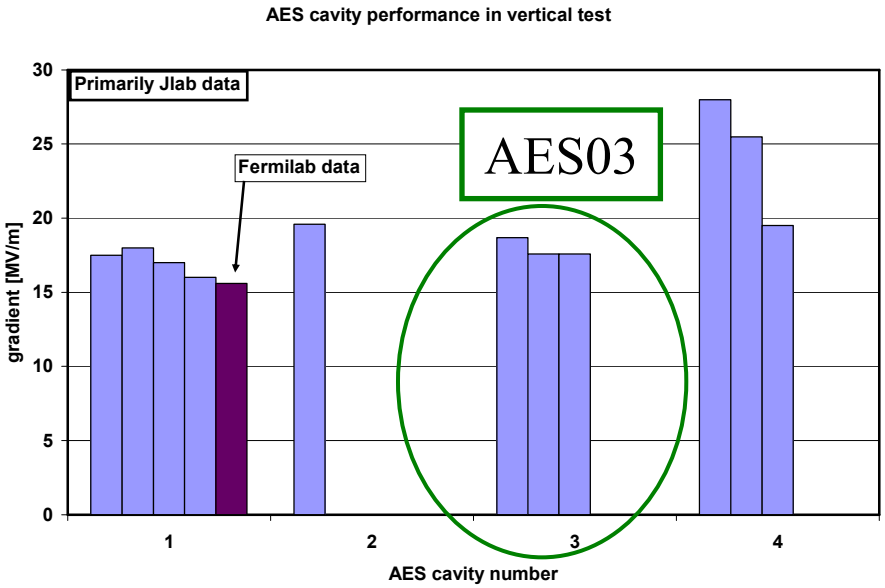
Note: all cavities get 150 um bulk EP

Material Removal (microns)
R. Geng, AES Meeting at JLab, Aug 2007

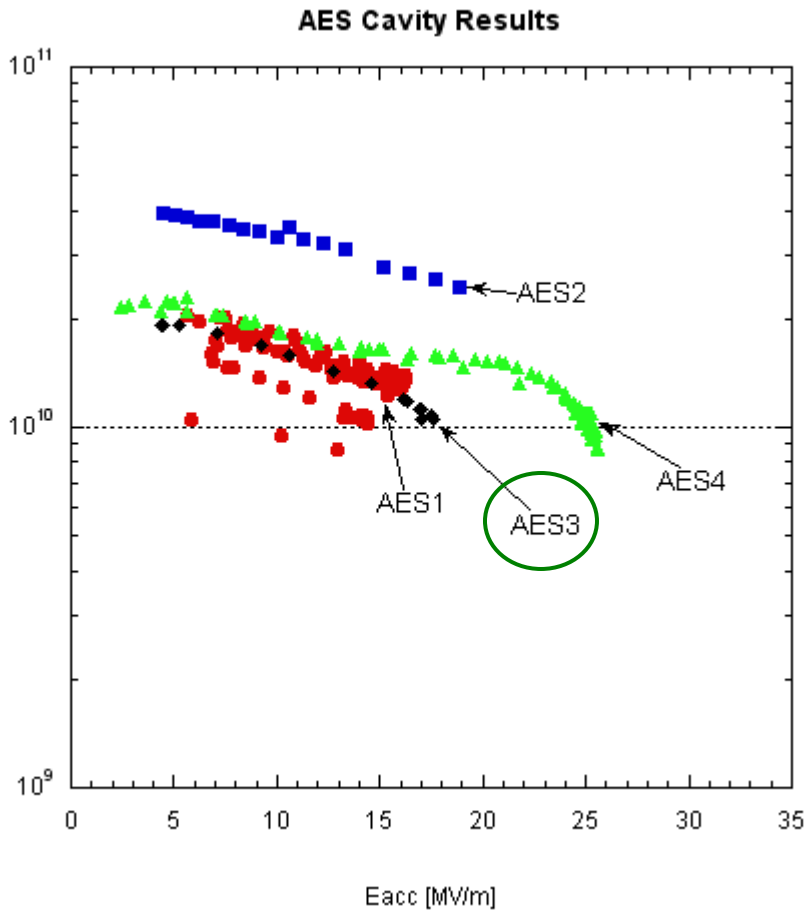
	1st test	2nd test	3rd test	4th test
A7	172	198	224	251
A6	187	213	239	265
AES1	213	236	252	269
AES2	164	190		
AES3	177	200		
AES4	221	257	277	

Note: updates to AES2,3,4 since August 2007 are not shown

JLab: all AES cavities together



R. Geng, AES Meeting at JLab, Aug 2007



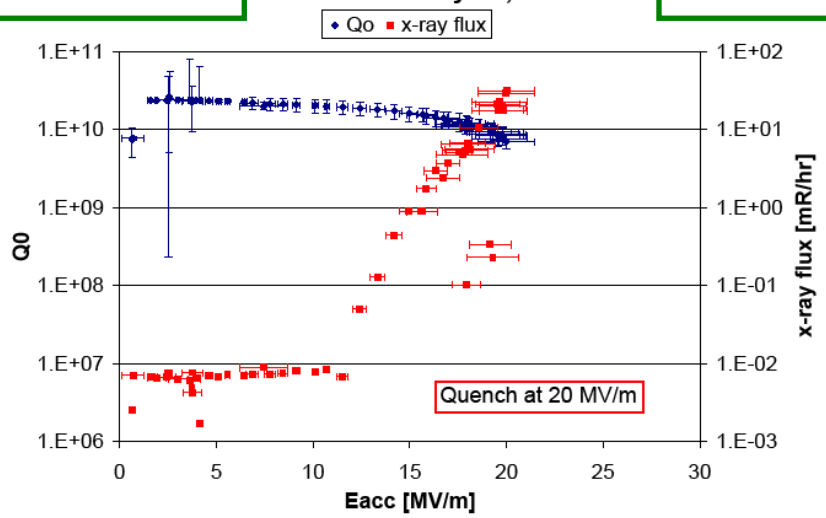
Note: updates to AES2,3,4 since August 2007 are not shown

Fermilab AES3 Activity

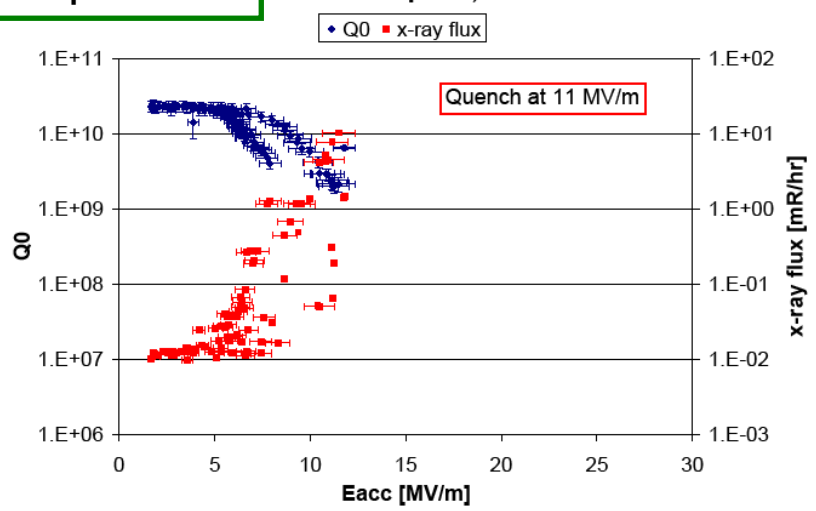
- Dec 21, 2008: Arrived at Fermilab from JLab
- First Fermilab RF test
  - Jan 3, 2008: Sent to MP9 for vacuum integrity check
  - ~Jan 11: send to IB1
  - Jan 18: Mount AES3 to cryostat top plate
  - ~Jan 23: attach thermometry
  - Jan 24: installed in VTS
  - Jan 25: begin cooldown
  - Jan 28-29: Cold RF test
- Variable coupler installed in cleanroom
- Second Fermilab RF test
  - Mar 31: installed in VTS
  - Apr 3: begin cooldown
  - Apr 3: Cold RF test

Fermilab RF Test of variable coupler

Previous test



Variable coupler test



- In between January 28 and April 3 tests, cavity sent to cleanroom to remove fixed coupler and install variable coupler
  - Two faulty flange seals before success
  - Used existing assembly fixtures: cavity horizontal, input port horizontal
  - Variable coupler parts were cleaned in ultrasonic bath, except ceramic feedthrough
  - No cavity cleaning was done, not even HPR
- Apparently, field-emission inducing dust was introduced